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The Genus *Cephalozia* in North America.

BY LUCIEN M. UNDERWOOD.

The Trigonanthae as outlined by Richard Spruce form a somewhat natural group of the Jungermaniaceae. With us the species are all foliose, but in certain neo-tropical genera the gametophyte is reduced almost to the condition of protonema, producing leaves only on the branches bearing the sex apparatus. In the Australasian genus *Zoopsis*, the simple thalloid shoot in some species is provided with rudimentary leaves only, formed of one or two cells. The tribe, therefore, contains within itself, some of the connecting links which ally the more usual forms to the simple primitive hepatics.

The tribe is characterized by the archegonia being borne on a usually short ventral branch,* with a normally triangular perianth, so placed that the third or odd angle is ventral, the remaining two being lateral. The underleaves are usually wanting or small, only attaining the dignity of a third series of leaves in some of the species of *Lepidozia*, though in *Bazzania* and *Kantia* they are well marked structures. The tribe contains some species that form conspicuous mats like *Bazzania*, but others are small, minute or even microscopic in size. They inhabit old logs, or grow on the ground in swamps, on clay banks or occasionally even in sand and on the faces of moss-covered rocks, but with us are rarely, if ever, found on erect trees, where the species of *Frullania*, *Lejeunea*, *Radula*

* Exceptions to this occur in some rare species of *Cephalozia* where they are terminal.

and *Porella* are most abundant. One species is semi-aquatic in bogs.

Schiffner* recognizes twenty-six genera. Strongly in contrast with this arrangement is that of Spruce,† in which ten of the genera recognized by Schiffner appear as sub-genera of *Cephalozia*. Probably a more rational arrangement would be reached in a mean between these two somewhat extreme views.

The genera represented in temperate and boreal North America may be separated by the following artificial synopsis based on forms lacking the sporophyte or perianth as species are often met with in this condition :‡

Leaves succubous or rarely transverse ; plants small or minute (except in some species of *Odontoschisma*).

Leaves deeply bidentate or bifid.

Underleaves rarely present except on perianth-bearing branches.

CEPHALOZIA.

Underleaves well developed.

Without root-hairs ; underleaves like those of the stem.

HYGROBIELLA.

With root-hairs ; underleaves undivided.

PLEUROCLADA.

Leaves rounded, entire or nearly so.

ODONTOSCHISMA.

Leaves incubous ; plants larger, often conspicuous (except in *Lepidozia*).

Leaves rounded, entire or minutely two-toothed ; perianth wanting, the sporophyte rising from a buried pouch.

KANTIA.

Leaves narrowed toward the end, usually 3-toothed.

BAZZANIA.

Leaves palmately 3-4-cleft or divided.

LEPIDOZIA.

* Hepaticae, in Engler-Prantl : Die natürl. Pflanzenfam. 13 : 94-103. 1893.

† On Cephalozia. 1882.

‡ The question so frequently asked by those who collect mosses is again answered here : "Why is it that we find hepatics so rarely in fruit?" In the first place the "fruit" (*sporophyte*) of the hepatic is less conspicuous than that of the true mosses and the seta is often short. The first answer then is : "Because you overlook it." In the second place there is a fundamental difference between the sporophyte of the hepatic and that of mosses. In the mosses the capsule develops after the seta ; the seta is, therefore, a somewhat permanent structure and the moss remains "in fruit" for a considerable length of time. In the hepatic the capsule develops within the calyptra (which in turn is surrounded by the perianth) until fully mature when the seta develops, pushing through the calyptra ; the seta is, therefore, a temporary and usually ephemeral structure, often withering away soon after the spores are scattered. The perianth is a more permanent structure, and specific and even generic characters are founded on it. Some stage of its development can usually be found in most hepatics. Except in a few cases the characters of the sporophyte are unimportant from a taxonomic standpoint when generic and specific limits are considered, a condition of things widely different from that which obtains among the mosses.

Of the above genera, *Hygrobrella* is represented by three north European species one of which *H. laxifolia* (Hook.) Spruce has recently been sent in from Idaho collected by Sandberg; it is also found in Greenland; *Pleuroclada*, a monotypic genus of boreal regions, has been found by Macoun in the Rocky Mts. of British America; *Odontoschisma* has three American species as known at present; *Kantia* is represented by four American species, one of them, *K. arguta* (N. & M.) Lindb., introduced in greenhouses;* *Bazannia*, so abundantly represented in tropical and south Temperate regions, has with us the two northern species that are likewise common in Europe; and *Lepidozia*, likewise a large genus of universal distribution, has with us only three species.†

The remaining genus, *Cephalozia*, is the largest and the most widely distributed genus of the tribe on our continent. The European species were somewhat increased in number by the researches of Lindberg in Scandinavia, and the greater part of the tangled synonymy, to which Lindberg also contributed, was worked out by Spruce in 1882, although he added to the tangle by knowingly giving to one species the same name that Lindberg had already given (unwittingly) to another species! The latest curiosity in the nomenclature of the genus is that expressed by Schiffner,‡ who, after establishing all of Spruce's subgenera as genera, rejected the old generic name, *Cephalozia*, which has been in use for over a half century, and adopted the subgeneric name *Eucephalozia*, first used by Spruce in 1882 to designate the typical members of the genus, as a generic name!

Cephalozia was proposed as a section of *Jungermania* by Dumortier in 1831 and was erected into a distinct genus by the same

**Kantia aquatica* Underw. in Hep. Amer. (exsic.) no. 107, is a curious sub, merged form of *Lejeunea* (probably *L. serpyllifolia*) which has lost its basal lobes, apparently a case of reversion resulting from its abnormal habitat. Herr Stephani discovered rudiments of a perianth in one specimen which led to the determination of the true relations of this curious form.

†*L. chaetophylla tenuis* Pears. cited by Evans (Bull. Torr. Bot. Club, 20: 308 1893), is a true *Blepharostoma* and must be known as *B. nematodes* (Aust.). It is *Cephalozia nematodes* Aust. Bull. Torr. Bot. Club, 6: 302. 1879. *L. Californica* Aust. Bull. Torr. Bot. Club, 6: 19, 1875, is of course *Ptilidium Californicum*.

‡*Loc. cit.* 97. A few such anarchistic movements in nomenclature, exceeding anything produced in this country with all its objectionable "*Freiheit*," and entirely without reason or warrant, mar this otherwise excellent work.

author in 1835 with *Jungermania byssacea* Roth. as a type species. It was not accepted by the authors of the Synopsis Hepaticarum 1844-7, but the same is true of many other early genera not proposed by Nees, one of the authors of the work. It was afterwards accepted by Gottsche, and later hepaticologists have accepted it without question, Schiffner alone excepted, as above stated. Of its sub-genera, as noted below, *Nowellia* differs most widely in its general facies from the rest of the genus, but none of the groups seem sufficiently separate for generic distinction. The genus as here recognized can be characterized as follows:

CEPHALOZIA Dumort.

Gametophyte mostly small or minute, usually close-creeping; stems branching ventrally or rarely laterally, often flagelliferous; leaves obliquely placed, succubous, bifid from one-third to over one-half their length; leaf cells usually large, transparent, mostly hexagonal; under-leaves usually wanting on the stems, often present on perianth-bearing branches. Perianth long, triangular, with a narrowed, toothed or ciliate mouth.

Sporophyte an oval or oblong-cylindric capsule on an ephemeral seta, varying in different species from 2 mm. to 2 cm. long.

The genus includes some sixty species well distributed, but best known from the North Temperate zone. Fourteen species are found in America north of Mexico. These can be distinguished by the following table, which has been constructed with special reference to material in which the perianth characters can not be seen:

Leaves deeply concave or somewhat saccate with two long, curved, slender divisions; perianth on a short ventral branch. § NOWELLIA.

Leaf cells 20-25 μ , isodiametric 1. *C. curvifolia*.

Leaves not deeply concave nor saccate.

Branching ventral; leaves bifid, but the leaf margins otherwise entire.

Leaves wider than the stem; involucre leaves not united. § EUCEPHALOZIA.

Leaves small, 0.35 mm. or less long.

Leaves wide (0.35-0.4 mm.) decurrent at base; leaf-cells 35-40 μ ; dioicous; perianth fleshy (3 cells thick at base.)

2. *C. media*.

Leaves narrow (0.2-0.25 mm.) not decurrent at base; leaf-cells 20-30 μ ; perianth thin.

Leaves strongly narrowed above the base; perianth obovate-oblong. 3. *C. Sullivantiae*.

- Leaves not specially narrowed above the base.
 Perianth linear-fusiform, widest below the middle; dioicous. 4. *C. catenulata*.
 Perianth linear-clavate, widest above the middle; dioicous or autoicous. 5. *C. Virginiana*.
 Leaves medium size, 0.5–0.65 mm. long; leaf-cells 40–50 μ .
 Leaves longer than broad, cleft half way to the base or more; perianth thin.
 Smaller; leaves 0.5 mm. or less long; usually monoicous. 6. *C. bicuspidata*.
 Larger; leaves 0.65 long with apiculate divisions; dioicous. 7. *C. extensa*.
 Leaves as broad or broader than long; monoicous; perianth fleshy, usually narrowed at base. 8. *C. pleniceps*.
 Leaves larger, 1–1.35 mm. long, usually narrowed at base; plant semi-aquatic. 9. *C. fluitans*.
 Leaves only about the width of the stem or even narrower; innermost involucre leaves united into a cup. § CEPHALOZIELLA.
 Plants small; stems 2–4 mm. long.
 Perianth linear or narrowly fusiform, the mouth denticulate or nearly entire. 10. *C. divaricata*.
 Perianth ovate-fusiform, the mouth ciliate. 11. *C. Macounii*.
 Plants minute; stems less than 2 mm. long.
 Underleaves lanceolate, entire, often present only near the end of the stem. 12. *C. Sullivantii*.
 Underleaves everywhere present, the upper ones bifid. 13. *C. minima*.
 Branching lateral; leaves bifid with dentate margins; perianth terminal; underleaves usually present. § PRIONOLOBUS.
 Leaves complicate-bifid, equitant. 14. *C. Turneri*.

1. CEPHALOZIA CURVIFOLIA (Dicks.) Dumort. Recueil d' Obs. sur les Jung. 18. 1835.

Jungermannia curvifolia Dicks. Pl. Crypt. Brit. 2: 15. pl. 5, f. 7. 1790.

Nowellia curvifolia Mitt. in Godman, Nat. His. Açores, 321. 1870.

Gametophyte a green or reddish slender creeping leafy axis, sparingly branching; leaves somewhat orbicular, deeply concave, with two slender incurved teeth widely separated at base and soon becoming one cell wide; underleaves wanting; leaf cells isodiametric, 20–25 μ in diameter: monoicous or dioicous; perianth on a short branch, triangular-prismatic, about 1.3 mm. long, plicate, with the mouth constricted and short ciliate; involucre leaves in two or three rows, deeply bifid with broad serrulate divisions.

Sporophyte a dark brown oval capsule 0.7–0.8 mm. long, on a short seta 0.5–2 cm. high; spores 6–8 μ in diameter, nearly spherical, dark brown; elaters 250 long, wider than the spores, bispiral.

A very common species on rotten wood distributed from the mountain region of Georgia to Wisconsin and northeastward; also European.

It has been distributed by Sullivant: Musc. Alleg. 242 (as *Jungermannia curvifolia*); Austin: Hep. Bor.–Am. 60; and in Hep. Amer. 17. Several figures exist; of these, Hooker, Brit. Jung. pl. 15, and Suppl. pl. 1, and Ekart, Syn. Hep. Germ. pl. 8. f. 59, are among the best; that in Smith, Eng. Bot. pl. 1304 poorly represents the plant.

2. CEPHALOZIA MEDIA Lindb. Medd. Soc. Faun. et Fl. Fenn. 6: 242. 1881.

Cephalozia multiflora Spruce, On Cephalozia, 37. 1882 (not of Lindb.).

Gametophyte a slender creeping, usually pale green leafy stem; leaves often wider than long, decurrent, slightly imbricate, bifid one third their length with an obtuse or rarely lunate sinus and acute connivent segments; leaf-cells mostly uniform, 36–40 μ in diameter; dioicous; perianth on a very short branch, linear-fusiform, fleshy, formed of three layers of cells at base and two above; antheridia usually near the apex of a branch. Sporophyte a short-stalked, oblong-cylindric capsule enclosed at first in a fleshy calyptra formed of three layers of cells; spores cinnamon-colored.

One of our most common species growing in large patches on decaying logs and rarely on the ground from Florida to Virginia, California and generally distributed over the northern portion of America; also European. The species was long confused with *C. connivens* (Dicks.) both in this country and in Europe. During this period it was distributed under the original name of *Jungermannia connivens* by Sullivant. Musc. Alleg. 246, and as *Cephalozia connivens* by Austin, Hep. Bor.–Am. 57. Lindberg, thinking that this species was the true *C. connivens*, gave to that species the name of *C. multiflora*. Later, Spruce, identifying the true *C. connivens*, unfortunately gave the same name (*C. multiflora*) to the present species. Under this name the species was distributed by

us in Hep. Amer. 38 and by Macoun, Can. Hep. 19* Fortunately Lindberg, a year earlier than Spruce, had given the species a name that will effectually blot out the confusion arising from the use of the homonym, *C. multiflora*.

3. CEPHALOZIA SULLIVANTIAE (Aust.)

Jungermannia Sullivantiae Aust. Bull. Torr. Bot. Club, 3: 12. 1872. (Not *J. Sullivantii* Aust. Proc. Acad. Phila. for 1869: 221. 1869.)

Gametophyte a short, close-creeping, sparingly branched stem; leaves whitish, usually spaced, about 0.3–0.35 mm. long, two-thirds as wide, strongly narrowed just above the base, somewhat ovate, erect, spreading or nearly horizontal, bifid to one-half or two-thirds their length, with obtuse sinus and acute usually divaricate divisions; leaf cells 25–30 μ in diameter; dioicous; perianth at the end of a very short branch, obovate-oblong, 1.2–1.5 mm. long, the mouth deeply 10-cleft; involucreal leaves mostly bifid with a large tooth on the outer margin near the middle or towards the base. Sporophyte a short-stalked mostly short oval capsule; mature spores not seen.

Apparently an uncommon species, seen only as yet from Ohio, whence it was distributed by Sullivant: Musc. Alleg. 241 (as *Jungermannia bicuspidata*, var. 2); Austin also reported it from Illinois, but I have seen no specimens. The name is unfortunately too near *C. Sullivantii* and may need change to prevent confusion.

4. CEPHALOZIA CATENULATA (Hüben.) Spruce, On Cephalozia, 33. 1882.

Jungermannia catenulata Hüben. Hepaticol. Germ. 169. 1834.

Jungermannia reclusa Tayl. Lond. Jour. Bot. 5: 278. 1846.

Cephalozia serriflora Lindb. Medd. Soc. Faun. et. Fl. Fenn. 1878.

* In my set of Macoun's Canadian Hepaticae this species occurs under the following numbers:

No. 39 as *Cephalozia Lammersiana*.

No. 18 as *Cephalozia catenulata*.

No. 20 (mostly) as *Cephalozia pleniceps*.

The species thus appears in one set of exsiccatae under four distinct names! The smaller species of Hepaticae, like *Cephalozia* and *Marsupella*, are likely to grow intermixed, so that the greatest care is necessary in selecting them for issues of exsiccatae which are to be used as works of reference. Spruce has called attention to the similar errors in European exsiccatae, particularly Gottsche and Rabenhorst's Hepaticae Europeae.

Gametophyte a slender creeping stem with pale leaves which are incurved in drying so as to cause the stems to resemble a chain; leaves subimbricate, slightly concave, oval-rotund, cleft one-half their length with a somewhat obtuse sinus and acute, more or less spreading divisions; leaf-cells $22-25\mu$ in diameter: dioicous; perianth on a short branch, 1.3 mm. long, linear-fusiform, widest below the middle, the mouth ciliolate; antheridia in the axils of the leaves of a short apical spike. Sporophyte a reddish oval-cylindric capsule borne on a short seta.

Somewhat common on the ground and on rotten wood from Newfoundland to British Columbia and probably southward, where it is often confused with the next species; also European. It was distributed by Austin in Hep. Bor. Am. 56.

5. CEPHALOZIA VIRGINIANA Spruce, On Cephalozia, 37. 1882.

Gametophyte a slender creeping whitish stem; leaves contiguous or slightly imbricate, obliquely ovate, cleft about to the middle, with acute or acuminate spreading divisions; leaf-cells isodiametric, about 22μ in diameter: dioicous or sometimes autoicous; perianth large, linear-clavate, widest above the middle, the mouth constricted and unequally short-setulose; antheridia in the axils of the leaves of a short spike. Sporophyte an oval-cylindric reddish brown capsule on a rather long seta.

Through the kindness of Mr. Pearson I have a fragment of the type specimen described by Spruce from Portsmouth, Virginia. The species appears to be more or less widely distributed through the Southern States, but in the absence of mature perianths is distinguished with difficulty from the preceding species. It was distributed in Hep. Amer. 72.

6. CEPHALOZIA BISCUSPIDATA (L.) Dumort. Recueil d'Obs. sur les Jung. 18. 1835.

Jungermannia bicuspidata L. Sp. Pl. 1132. 1753.

Jungermannia Lammersiana Hüben. Hepaticol. Germ. 165. 1834.

Gametophyte a slender prostrate greenish leafy stem, 1-3 cm, long, flagelliferous branching; leaves distant in the basal portion. imbricate toward the apex, round-ovate, cleft to the middle or beyond, with spreading lanceolate, acute or acuminate lobes; leaf cells uniform, $30-40\mu$ in diameter: monoicous or in one form dioicous; perianth on a very short branch, about four times the length of the leaves, somewhat fusiform. Sporophyte cylindric-oblong on a short seta; calyptra thin; spores purple.

On rotten wood and on the ground; widely distributed from Newfoundland to British Columbia and southward along the Appalachian area; also reported from California (*Howe*); the species is also European. It was distributed by Sullivant: *Musc. Alleg.* 240 (as *Jungermannia bicuspidata*); by Austin: *Hep. Bor. Am.* 58, 59, the latter as var. *conferta*, a form with crowded leaves; and in *Hep. Amer.* 71. The form known as *C. Lammersiana* found in the British Possessions can hardly be maintained as distinct.

The species has been frequently figured, the best figures being Hooker, *Brit. Jung. pl.* 11, and *Suppl. pl.* 4; Ekart, *Syn. Jung. Germ. pl.* 4, f. 23; and Smith, *Engl. Bot. pl.* 2239.

7. *CEPHALOZIA EXTENSA* (Tayl.) Spruce, *On Cephalozia*, 44. 1882.

Jungermannia extensa Tayl. *Lond. Jour. Bot.* 5: 279. 1846.

Gametophyte a prostrate pale or rufous, sparingly branched leafy stem; leaves spreading, complicate-concave, those of the basal portion contiguous, those of the apical portion crowded, bifid more than one-half their length, with triangular-lanceolate acuminate and often apiculate divisions; leaf-cells about $35\ \mu$ in diameter: dioicous; perianth on a more or less elongated branch, linear-fusiform or sub lanceolate, three times the length of the involucre leaves, which are in three or four ranks, deeply cleft and slightly longer than the ordinary stem-leaves. Sporophyte a long-stalked oval capsule, 0.7 mm. long; spores about $9\ \mu$ in diameter.

This plant was originally described from material collected by Dr. Scouler at Observatory Inlet, N. W. America and appears from present data to extend from Washington and British Columbia to northern California. It was distributed in *Can. Hep.* 22.

8. *CEPHALOZIA PLENICEPS* (Aust.) Lindb. *Medd. Soc. Faun. et Fl. Fenn.* 9: 158. 1883.

Jungermannia pleniceps Aust. *Proc. Phila. Acad. for* 1869: 222. 1869.

Cephalozia crassiflora Spruce, *On Cephalozia*, 40. 1882.

Gametophyte a short slender prostrate leafy stem; leaves thick, obliquely orbicular, concave, not decurrent, cleft one-fourth to one-third their length, with acute or somewhat obtuse sinus and acute lobes; leaf-cells rather large, $36\text{--}40\ \mu$ in diameter: monoicous; perianth terminal on a short branch, 2.6 mm. high, obovate-cylindric, fleshy, three cells thick at base, reduced to two cells above the middle; involucre leaves in about three ranks, ap-

pressed, fleshy, composed of two strata of cells near the base; antheridia in the axils of smaller leaves crowded in spikes. Sporophyte a short-stalked oval capsule, 0.8 mm. long, enveloped until maturity in a thin calyptra; spores about $9\ \mu$ in diameter.

The type locality of Austin's plant was in the White Mountains of New Hampshire; that of Spruce's *C. crassiflora* in the Pyrenees. It occurs on the mountains of New England and in Canada, and according to Pearson extends westward to British Columbia; also reported from California (*Howe*). It is likely to be confused with *C. media* on account of its thick perianth, which in section is found to be made up of three strata of cells at base, and two strata if the section is made higher up; *C. media* is smaller and dioicous, with strongly decurrent leaves and probably has a much wider range in both latitude and altitude. *C. pleniceps* is also reported from various parts of Europe.

9. CEPHALOZIA FLUITANS (Nees) Spruce. on Cephalozia, 50. 1882.

Jungermannia fluitans Nees, in Syll. Ratisb. 129. 1823.

Cephalozia obtusilobata Lindb. Bot. Notiser, 1872: 164. 1872.

Gametophyte a slender elongate axis, growing over *Sphagna* or semi-aquatic; leaves distant, oval, ovate or oblong, somewhat cuneate at base, bilobed one-third to one-half to the base, with a narrow acute sinus and usually obtuse lobes; leaf-cells hexagonal, 40–50 μ in diameter: dioicous; perianth on a short branch, about 3 mm. long, oval, cylindric, trigonal only at the apex; involucre leaves rather smaller than the ordinary stem-leaves, bifid to the middle, with acute lobes. Sporophyte an oblong or oblong-cylindric capsule, on a short seta; spores minutely tuberculate.

Growing in wet places, in Sphagnum bogs or semi-aquatic in the margin of pools, New Jersey and New England to Labrador and northwestward. It has been distributed by Austin in Hep. Bor. Am. 35 (as *Jungermannia inflata* var. *fluitans*) and in Hep. Amer. 154, 173.

10. CEPHALOZIA DIVARICATA (Sm.) Dumort. Hep. Europ. 89. 1874.

Jungermannia divaricata Smith, Engl. Bot. pl. 719. 1800.

Jungermannia byssacea Roth, Fl. Germ. 3: 387. 1800.

Jungermannia confervoides Raddi, Mem. Soc. Mod. 18: 29. pl. 4. f. 1. 1820.

Jungermannia Starkii Funck; Nees, Europ. Leberm. 2: 215, 225. 1836.

Jungermannia Grimsulana Jack; Gott. et Rabenh. Hep. Europ. No. 56.

Gametophyte a slender green olivaceous or almost black, leafy stem with leaves scarcely wider than its diameter; leaves mostly spaced, especially on sterile stems, cleft about half-way to the base, the lobes complicate or divergent, acute; underleaves mostly wanting: dioicous; perianth linear or narrowly fusiform, sometimes purple toward the base, prismatic, 3-6-angled, the mouth somewhat constricted, denticulate or nearly entire; involuclral leaves larger, more or less connate, bifid, the lobes denticulate. Sporophyte an oblong-globose capsule on a short seta.

On sand and rocks and occasionally on rotten wood, New Jersey to Labrador, and on the Pacific coast from California northward; also European. It was distributed by Austin in Hep. Bor. Am. 51, 52, 53, 54; and in Hep. Amer. 155.

The species has been well figured. Besides the figures of Smith and Raddi, noted above, the more important are Hooker. Brit. Jung. *pl.* 12 and Ekart, Syn. Jung. Germ. *pl.* 4. *f.* 34.

11. CEPHALOZIA MACOUNII (Aust.) Aust. Hep. Bor. Am. no. 55. 1873.

Jungermannia Macounii Aust. Proc. Phila. Acad. for 1869: 222. 1869.

Gametophyte a short creeping more or less branched leafy stem; leaves contiguous or somewhat imbricate, broadly spreading, bifid a little beyond the middle, the lobes spreading and broadly subulate, 2-4 cells wide at base, mostly acute; leaf-cells 15-18 μ in diameter; underleaves wanting: dioicous; perianth about 0.7 mm. long, whitish, ovate-fusiform, the mouth narrowed and ciliate; involuclral leaves 2 or 3 pairs, appressed, 2-3-cleft nearly one-half their length, irregularly spinulose. Sporophyte not seen.

On rotten logs, mountains of New England (Austin), Ontario and British Columbia (Macoun). The plant was distributed by Austin: Hep. Bor. Am. 55. The species is rarely collected.

12. CEPHALOZIA SULLIVANTII (Aust.) Aust. Hep. Bor. Am. No. 50, 1873.

Jungermannia Sullivantii Aust. Proc. Phila. Acad. for 1869: 221. 1869.

Gametophyte an exceedingly minute mostly simple, fleshy stem, often less than a millimeter long; leaves imbricate, ovate-orbicular, usually narrower than the stem, bifid with an acutish sinus; underleaves lanceolate-ovate, entire, often apparent only near the ends of the stems; perianth terminal on ascending stems, 0.5 mm. or less long, oval or somewhat obovate, plicate and truncate at the mouth. Sporophyte an oval capsule on a seta scarcely longer than the perianth.

Among mosses on rotten wood, New Jersey and Ohio (*fide* Austin); also Belleville, Ontario (Macoun). Not often collected but likely to be overlooked by collectors on account of its almost microscopic size. It was distributed by Sullivant: Musc. Alleg. 239 (as *Jungermannia divaricata*); this number forms the type; it was also distributed by Austin: Hep. Bor. Am. 50.

13. CEPHALOZIA MINIMA Aust.; Pearson, List Can. Hep. 11. *pl.* 6. 1890.

Gametophyte a minute dark green, usually simple leafy axis; leaves about the width of the stem, obovate or subquadrate, bifid one-third their length, with acute divisions, the margins entire; leaf cells 4-6-sided, about 16 μ in diameter; underleaves present, the lower entire and subulate, the upper larger and bifid: dioicous; perianth acrocarpus, oblong-oval, with rather wide sub-entire mouth; involucre leaves 3 pairs, larger than the ordinary stem-leaves, subquadrate, bifid one-third to one-half their length, spinulose-dentate; antheridia on short branches. Sporophyte not seen.

On rotten logs, Belleville, Ontario (Macoun); known only from the type specimen.

14. CEPHALOZIA TURNERI (Hook.) Lindb. Acta Soc. Sci. Fenn. 10: 502. 1875.

Jungermannia Turneri Hook. Brit. Jung. *pl.* 29. 1816.

Gametophyte a prostrate slightly branched leafy stem, 2-5 mm. long; leaves approximate, equitant, complicate-bifid half-way to the base, the margin everywhere sharply and unequally serrate-dentate; underleaves wanting: dioicous or monoicous; perianth whitish, 0.3-0.5 mm. long, pentagonal-prismatic, the mouth almost closed, obscurely ciliolate; involucre leaves larger than the ordinary stem-leaves, spinose-dentate, bifid with acute divisions. Sporophyte and oval capsule on a slender seta; spores dark brown, about 8 μ in diameter; elaters dark brown, about 200 μ long, with two close spirals.

This species was first announced by Mr. M. A. Howe from

Marin and San Mateo counties, California,* but a scrap of it had been previously collected (1888) with *Polytrichum* by Miss M. E. Parsons, of San Rafael, and overlooked in my collection. It is found mostly on the ground and is an interesting addition to our flora. It has long been known in Europe, but does not appear to be common. It was distributed in Hep. Am. 174, from fine material sent by Mr. Howe. The species has been illustrated in Smith, Engl. Bot. *pl.* 2510 and in Ekart, Syn. Jung. Germ. *pl.* 9, *f.* 69 in addition to the citation of Hooker above.

Species dubiae et inquirendae.

CEPHALOZIA DENTATA (Raddi) Spruce, On Cephalozia, 71. 1882.

Jungermannia dentata Raddi, Mem. Soc. Mod 18: 22. *pl.* 4. *f.* 4. 1818.

(This species was reported by Mitten, Jour. Linn. Soc. 8: 52, 1865, under the name *Trigonanthus dentatus*, from Galton Mountains, British Columbia, but as it is not otherwise known from North America the identification needs to be verified.)

CEPHALOZIA CONNIVENS (Dicks.) Dumort, Recueil d' Obs. sur les Jung. 18. 1835.

Jungermannia connivens Dicks. Pl. Crypt. Brit. fasc. 4: 19. *pl.* 11. *f.* 15. 1801.

Cephalozia multiflora Lindb. Acta Soc. Sci. Fenn. 10: 501. 1875. (not Spruce *l. c.*)

(This species has been frequently reported from America but has been confused with *C. media*. It is likely to occur northward and can be distinguished from that species by its large leaf-cells (66 μ in diameter) and its perianth formed of a single layer of cells, with long ciliate mouth.)

* * *

The publication of a revision like the above is often accepted by botanical collectors as an indication that the information regarding the genus is closed. As a fact such a revision merely indicates the extent of our knowledge for the present and forms a datum line for further study. It also shows or ought to show the limitations of our knowledge. The remarks to follow apply not only to the genus *Cephalozia*, but to all genera and species of He-

* Erythea, 4: 50. 1896.

paticae. Our knowledge of the distribution of species is very much limited. We know next to nothing of the Hepaticae of the entire range of the Rocky Mountains south of northern Idaho, and Mr. Leiberg and others who have sent in considerable quantities of interesting plants from farther north have only shown us the stores of information awaiting the collector in that region. Colorado, Utah, the Sierras from Oregon southward, and all the Southwest from Missouri to Texas, New Mexico and Arizona are a great unknown, no less among all of the lower cryptogams than in the Hepaticae. Much more needs to be done throughout all the States of the Mississippi valley, and especially the southern extension of the Appalachian area, which needs the careful attention of the resident observer, rather than the hasty notes of the transient collector. It is hoped that the above synopsis and descriptions will be sufficient to provide for any student of the group the ready means of identifying his material; we shall be pleased to receive doubtful material, or that illustrating additional facts of distribution.

NEW YORK, 24 September, 1896.

Notes on *Potentilla*.--IV.

By P. A. RYDBERG.

(Plates 274 and 275.)

The *Aureae* resemble much the *Frigidae* except that the leaves have more than three leaflets. They are all low plants, generally less than 2 cm. high, except *P. dissecta*, which sometimes reaches a height of 3 cm. The pubescence is scant, silky, strigose or hirsute, only in a variety of *P. dissecta* a little tomentose on the lower surface of the leaves, and the plant often becomes glabrous and shining in age. The style in all is very slender and filiform, fastened near the apex of the achene and generally much longer than the achene. Most of the species belonging to this group have truly digitate leaves, but in the North American representatives the outer leaflets are often inserted lower down and the leaves become pinnate with approximate leaflets.